

Fact Sheet

DREDGING TO REMEDIATE WHITE PHOSPHORUS CONTAMINATION IN PONDS

PROBLEM

Extensive research conducted by CRREL and other agencies indicates that the cause of massive waterfowl deaths at Eagle Rivers Flats on Fort Richardson, Alaska, is ingestion of white phosphorus particles. The white phosphorus originated from detonated smoke rounds used during military training exercises conducted on the Flats. Although the majority of the white phosphorus particles oxidized before they landed, burning particles that landed in ponded areas were extinguished and sank to the bottom of the water. These particles continue to persist in the cool, wet sediments found in permanently ponded areas. Dabbling ducks and swans ingest the white phosphorus when feeding on the pond bottoms. The problem is to remove the white phosphorus with minimal disruption to the feeding grounds on this natural flyway, and is complicated by the potential presence of large quantities of unexploded ordnance and the frequent occurrence of flooding tides.

SOLUTION

CRREL research indicates that by reducing the water content of the pond sediments below about 30 to 40% by volume and exposing these sediments to air, the white phosphorus should oxidize naturally. CRREL, funded by the Environmental Resources Division of the DPW, Fort Richardson, Alaska, has developed an electro-hydraulic, remote-controlled dredging system to dredge in shallow ponds. The dredge incorporates an auger-type head and is propelled by a hydraulic capstan. The capstan engages a cable strung between deadmen placed by helicopter and anchored in selected locations around the ponds. The dredge operator sits in an armored control cab on shore near the dredging site. TV cameras mounted on the dredge provide a general visual indication of operations, and a heads-up display of dredge mechanical functions is superimposed on the TV monitor to provide additional operator information. The inlet to the dredge pump includes a CRREL-designed trash rack to prevent ingestion of unexploded ordnance, and a revolving knife sweeps by the front surface of the trash rack to clear vegetation and other debris. Dredge spoils are pumped through flexible hose over water and rigid plastic piping over land to the spoils retention basin, which is constructed to allow controlled dewatering of the dredged material. The remediation concept is to dry the solid dredged material in the basin and allow the white phosphorus to sublimate and oxidize naturally.

STATUS

A demonstration project was conducted during the summer of 1995, with the goal of determining whether dredging is a feasible alternative for the Eagle River Flats remediation. After overcoming various operational problems, the dredge is now performing as planned; subject to results of the remediation study, dredging appears to be a feasible alternative. Production rates of up to 800 cubic yards per hour have been attained. Sampling and monitoring is being performed following strict quality assurance/quality control procedures in accordance with the Comprehensive Environmental Response, Compensation and Liability Act, and the National Contingency Plan.

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